Published in final edited form as:
Sex Transm Dis. 2012 May ; 39(5): 394–401. doi:10.1097/OLQ.0b013e318248aaa0.

HPV vaccine discussions: An opportunity for mothers to talk with their daughters about sexual health

Annie-Laurie McRee, DrPH[a], **Sami L. Gottlieb, MD, MSPH**[b], **Paul L. Reiter, PhD**[a,c], **Patricia J. Dittus, PhD**[b], **Carolyn Tucker Halpern, PhD**, and **Noel T. Brewer, PhD**[a,c]

[a]UNC Gillings School of Global Public Health

[b]Centers for Disease Control and Prevention, Division of STD Prevention

[c]UNC Lineberger Comprehensive Cancer Center

Abstract

Purpose—Mother-daughter communication about sex is associated with healthier behavior during adolescence. We sought to characterize mothers' communication with their daughters about human papillomavirus (HPV) vaccine and the potential for these discussions to provide an opportunity for talking about sexual health.

Methods—During December 2009, we conducted an online survey with a nationally representative sample of U.S. mothers of females ages 11–14 years (n=900; response rate=66%). We used 3 complimentary approaches to assess HPV vaccine as an opportunity for mother-daughter communication about sex. Estimates are weighted.

Results—Sixty-five percent of mothers reported talking with their daughters about HPV vaccine, of whom 41% said that doing so led to a conversation about sex. Mothers who had talked with their daughters about HPV vaccine were more likely than those who had not to have also talked with their daughters about sex (92% vs. 74%, OR=3.25, CI=1.57–6.68, p<.05), in multivariate analyses. Among mothers who talked about sex when they talked about HPV vaccine, many felt that HPV vaccine provided a good reason to do so (64%) or that it made it easier to start a conversation (33%).

Conclusions—HPV vaccine discussions provide a cue to mother-daughter communication about sex that is as important as some more widely recognized cues. Discussions about HPV vaccine are an acceptable opportunity for mothers to talk with their daughters at an age when communication about sex is most influential. It may be possible for parents to capitalize on HPV vaccine discussions already happening in many families to promote sexual health.

Keywords

HPV vaccine; Communication; Mother-daughter relations

Corresponding author: Annie-Laurie McRee, DrPH, UNC Gillings School of Global Public Health, Department of Health Behavior and Health Education, 325 Rosenau Hall, CB 7440, Chapel Hill, NC 27599; Phone: 919-843-3105; Fax: 919-966-2921; almcree@email.unc.edu.

Conflicts of Interest:
Although we do not believe we have any conflicts of interest, we share the following information in the interest of full disclosure. Authors have received research grants from Merck & Co., Inc. (NTB, PLR) and GlaxoSmithKline (NTB) and honoraria or consulting fees from these companies (NTB). These funds were not used to support this research study.

Introduction

Parent-child communication about sex, particularly communication with daughters, is important because it is associated with decreased sexual risk taking during adolescence and an older age at sexual debut.[1, 2] Parents need to have these conversations early and often for them to be most effective. Communication ideally begins *before* children start having sex;[2] however, many parents underestimate their children's level of sexual activity, and their timing of communication is often late, occurring after sexual debut, if at all.[3–5] For example, in a recent study of parent-adolescent dyads, 40% of youth had intercourse before their parents talked with them about safer sex.[3] Frequency of communication also matters. Discussing sex topics repeatedly, rather than as a single conversation or "big talk," provides parents with opportunities to reinforce messages, answer questions, and tailor content to their children's development, potentially increasing the protective benefits of communication.[6] These findings underscore the need to promote communication about sex between parents and their children during early adolescence.

Many parents rely on situations that arise spontaneously to prompt conversations with their children about sex. These cues can include external events, such as something seen on television or a child's school providing a sex education class,[7] but they can also include developmental changes, such as a daughter's menarche or interest in sex.[8] Conversations about sex topics may also be part of broader discussions about puberty or topics not directly related to sex.[9] Understanding whether and how cues are effective in prompting such conversations is important for public health.

One potential cue to talking about sex that has gone largely unexamined is mother-daughter communication about human papillomavirus (HPV) vaccine. U.S. guidelines recommend routine administration of HPV vaccine to 11 or 12 year old girls with catch-up vaccination through age 26.[10] Since HPV is a common sexually transmitted infection (STI), discussions about HPV vaccine may provide an opportunity for parents to talk with their young adolescent daughters about STIs and other sexual health issues. Furthermore, as HPV vaccine is administered in 3 shots over 6 months,[10] discussions about the vaccine may provide multiple opportunities to talk about sex. Many studies, both pre- and post-vaccine licensure, have found that most parents intend to vaccinate their adolescent daughters against HPV,[11, 12] and just under half have done so now that the vaccine is available.[13]

While recent research suggests that many parents talk with their daughters about HPV vaccine,[14, 15] little is known about the role of HPV vaccine discussions as a cue to talking about sex. The purpose of the present study was to characterize mothers' communication with their daughters about HPV vaccine, and assess the potential for HPV vaccine to provide an opportunity for mothers to talk with their early adolescent daughters about sex.

Methods

We surveyed a nationally representative sample of mothers of adolescent females aged 11–14 years during December 2009. All mothers were members of an existing panel of U.S. households maintained by the survey company, Knowledge Networks. The survey company recruits members using a dual frame approach, combining list-assisted, random-digit dialing and address-based random sampling.[16] In exchange for completing surveys, panel members accumulate points which can be redeemed for small cash payments. Households without pre-existing internet are provided a laptop computer and internet access.

The survey company invited 1,681 mothers to complete our cross-sectional online survey (Figure 1). Among those mothers, 1,170 (70%) responded to the invitation, and 1,009 were eligible to participate in the study as they had daughters ages 11–14 years. A total of 951

mothers of 11–14 year-old females consented to participate and completed the survey in December 2009 (response rate=66%[17]). If a mother reported having more than one daughter in the age range, the daughter with the most recent birthday was selected as the index child for survey questions.

Participants were more likely than non-participants to have a college degree, but they did not differ on other sociodemographic characteristics. In the present analysis, we report data from 900 mothers, having excluded those with missing values for items assessing mother-daughter communication about sex or HPV vaccine, and other potential cues to talking about sex (n=51, 5% of total sample). Mothers in the analytic sample and those whose data we excluded had similar sociodemographic characteristics in bivariate analyses. The Institutional Review Board at the University of North Carolina approved the study.

Measures

The UNC Mother-Daughter Communication Study survey is available online at www.unc.edu/~ntbrewer/hpv. We developed survey items based on established measures in the literature [18] as well as our own HPV vaccine research involving parents of adolescent girls.[15, 19] We cognitively tested the survey with 8 mothers of pre-adolescent and adolescent children prior to the study to ensure that instructions and items were clear and to confirm that participants interpreted items as intended.

Mother-daughter communication about sex—The survey assessed mother-daughter communication about sex through the question: “Have you ever talked with [daughter’s name] about sex topics? These might include what sexual intercourse is, when you start having sex, how to keep from getting pregnant, diseases you can get when you have sex, HIV/AIDS, and condoms.” (yes/no). Mothers who responded “yes” received a question about how old their daughters were when they first talked about sex topics.

Mother-daughter communication about HPV vaccine—The survey assessed mother-daughter communication about HPV vaccine with the question: “How much have you talked with [daughter’s name] about HPV vaccine?” (“a little” or “a lot = 1, and “not at all”= 0). For mothers who reported having talked with their daughters about HPV vaccine, the survey presented follow-up questions about who first brought up the topic of HPV vaccine what prompted them to bring up the topic (check all that apply from a list of responses), and whether talking about HPV vaccine led to a discussion with their daughters about sex topics (yes/no). Among mothers who said “yes,” the survey assessed their perceptions of HPV vaccine as an opportunity to talk with their daughters about sex through 4 agree-disagree statements. For mothers who had not yet talked with their daughters about HPV vaccine, the survey assessed agreement with 5 statements that described reasons for not discussing it. We coded all agree-disagree statements so that “strongly agree” or “agree”= 1, and “neither agree nor disagree,” “disagree,” or “strongly disagree”= 0.

Other potential cues to talking about sex—The survey assessed other potential cues to talking with their daughters about sex topics including whether: mothers had talked with their daughters about puberty or drugs/alcohol; their daughters had gotten their period; their daughters had shown an interest in boys/dating; their daughters received sex education at school; their daughters had initiated the HPV vaccine series; and their daughters may be sexually active. Mothers who reported having a potential cue received a follow-up question about whether that cue led them to talk with their daughters about sex topics (yes/no). The survey also assessed whether mothers had talked with their daughters about sex topics because: their daughters asked about it, their daughters’ friends were having sex or talking about sex, something in the news, on television or on the internet, or something else.

The survey collected information about sociodemographic characteristics, knowledge about HPV and HPV vaccine, and other factors associated with mother-daughter communication about sex in previous studies, including mothers' attitudes towards their daughter having sex as a teenager,[20] personal history of talking about sex with their own mothers,[21] satisfaction with their relationship with their daughters,[22] and perceived ability to communicate with their daughters,[6, 7, 9] as well as whether the daughters have an older sister.[23]

Data analyses

We used 3 separate but complimentary approaches to assess HPV vaccine as an opportunity for mother-daughter communication about sex. First, we calculated the proportion of all mothers who said each cue led to a conversation about sex topics; we call this the "attributable proportion." We compared the attributable proportion for HPV vaccine discussions to other potential cues using McNemar's chi-square test. Second, we assessed whether mothers' communication with daughters about HPV vaccine was independently associated with communication about sex. We ran a series of bivariate logistic regression models assessing associations between sociodemographics and potential cues to talking about sex with the main outcome. We then entered all variables bivariately associated ($p<.10$) with communication about sex into a multivariate model. We also examined whether daughters' age and HPV vaccination status moderated the effect of HPV vaccine discussions on mother-daughter communication about sex. Finally, we assessed mothers' perceptions of HPV vaccine as an opportunity to discuss sex topics with their daughters. We conducted all analyses in Stata SE version 10.0 (Statacorp, College Station, TX). Analyses (including proportions, means, and odds ratios [ORs]) incorporated sampling weights to yield nationally-representative estimates. Frequencies are not weighted. All statistical tests were two-tailed using a critical alpha of .05 unless otherwise noted.

Results

Sample characteristics

Most mothers were less than 50 years old (90%; mean=40.6, standard deviation=6.7, range: 27–63), non-Hispanic white (64%), married or living with a partner (81%), and from an urban area (82%; Table 1). About one-third of mothers had a college degree (30%), and half reported a household income of at least $60,000 (52%). Most mothers (86%) felt their communication with their daughter was very good or excellent, and most (75%) believed their daughter should wait until married to have sex. Daughters ranged in age from 11–14, with roughly equal proportions in each age group.

Cues to mother-daughter communication about sex

Sixty-five percent of mothers reported talking with their daughters about HPV vaccine, of whom 41% said that doing so led to a conversation about sex (Table 2). The proportion who reported talking about sex during HPV vaccine discussions did not vary by daughters' age ($p=.15$). Among all mothers, 27% talked about sex as a result of HPV vaccine conversations (attributable proportion). This is similar to the proportion of mothers in the sample who talked with their daughters about sex as a result of talking about alcohol or drugs (29%), or because their daughters had gotten their periods (21%), even though mother-daughter discussions about alcohol or drugs were more commonly reported. More mothers talked with their daughters about sex because they talked with them about puberty (68%), because their daughters asked (63%), or because of something in the media (60%). Overall, few mothers were prompted to talk with their daughters about sex because they believed that their daughters may be sexually active (6%) or received HPV vaccine (11%), in part because these cues were not widely reported in the sample.

Correlates of mother-daughter communication about sex

The majority of mothers (86%) reported ever having talked with their daughter about sex (Table 3). The mean age of daughters at which the mothers first talked about sex was 10 years old (SD=2.2 years). In multivariate analyses, mothers who talked with their daughters about HPV vaccine had greater odds of talking with their daughters about sex topics than mothers who did not (OR=3.23, 95% CI: 1.57–6.68). Mothers were also more likely to report talking with their daughter about sex topics if their daughters had gotten their period (OR=2.37, 95% CI: 1.08–5.23), showed an interest in boys (OR=2.52, 95% CI: 1.25–5.02), or had sex education at school (OR= 2.19, 95% CI 1.13–4.22). In addition, communication with daughters about sex was significantly more likely among mothers who: had a college degree (OR=2.62, 95% CI: 1.24–5.50); felt their communication with their own daughters was very good or excellent (OR=3.04, 95% CI: 1.28–7.24); reported having talked with their own mothers about sex when they, themselves, were teenagers (OR=5.75, 95% CI: 2.32–14.21); or lived in the western (vs. the northeastern) region of the U.S. (OR=2.80, 95% CI: 1.11–7.08). The association between HPV vaccine discussions and mother-daughter communication about sex did not differ by daughters' age (p=.67) or HPV vaccination status (p=.84); as a result, we did not include these interaction terms in the final model.

Mothers' perceptions of HPV vaccine discussions

Most mothers who talked with their daughters about sex when they discussed HPV vaccine reported that HPV vaccine discussions provided a good reason to do so (64%). Additionally, one-third of mothers found that talking about HPV vaccine made it easier to start a conversation with their daughters about sex (33%), and a quarter reported that it gave them an opportunity to do so that they might not have had otherwise (27%). However, the vast majority reported that they would still talk with their daughters about sex even without talking about HPV vaccine (98%).

Of mothers who had talked with their daughters about the vaccine (n=594), most reported that these discussions began because mothers brought up the topic themselves (52%) or that a doctor or other health care provider did (35%). Among mothers who brought up the topic themselves, most did so because a health care provider prompted them (35%) or because of an advertisement for the vaccine (26%). Other reported prompts to talking about HPV vaccine included: something in the news or media (11%) and information from their daughter's school (3%).

Among mothers who had not yet talked with their daughters about HPV vaccine (n=306), the main reasons reported for not doing so were: not knowing enough about the vaccine (42%); believing their daughters were too young (38%); not wanting to get their daughters vaccinated (37%); and not receiving a doctor recommendation to get the vaccine (22%). One-fifth of mothers said they just had not gotten around to it yet (20%). Only 5% reported not talking about HPV vaccine because they did not want to talk with their daughters about sex.

Discussion

Our findings indicate that HPV vaccine could provide a new and effective cue to prompt parents to talk with their young adolescent children about sex. In this nationally-representative sample, most mothers reported having talked with their 11–14 year old daughters about HPV vaccine, and many of these mothers included messages about sex in their HPV vaccine discussions, consistent with our previous research on HPV vaccine communication among mothers and daughters in North Carolina.[15] In addition to confirming correlates of mother-daughter communication about sex found in previous studies (e.g., daughter's menarche,[18] general communication skills,[6] personal experience talking with

their own mother[21]), our study also identifies a novel correlate — mothers' discussions with their daughters about HPV vaccine were associated with their communication about sex, even controlling for these other factors.

To our knowledge, this study is among the first to compare multiple potential cues to talking about sex. We found that HPV vaccine discussions provide a cue to talking about sex that is as important as some more widely recognized cues (such as menarche),[2, 24, 25] even though HPV vaccine discussions have not yet been promoted as a possible cue to parent-child communication. Many mothers who included sex topics in their HPV vaccine discussions reported that talking about the vaccine facilitated discussing sex by providing a good reason or by making it easier to start the conversation.

Taken together, these findings suggest that it may be possible to capitalize on HPV vaccine discussions to facilitate parent-child communication about sex. Some mothers may not talk with their daughters about sex because they have difficulty beginning conversations or finding the "right" time to talk.[22, 26, 27] For mothers who have not yet talked with their daughters about sex, initiating HPV vaccine discussions may provide an avenue to begin talking with their daughters about sex topics. As a substantial proportion of mothers in our sample had low knowledge of HPV and HPV vaccine, previous research suggests that education about the vaccine and health care provider recommendation might promote HPV vaccine communication among more mothers and their daughters,[15] as well as potentially increase vaccine acceptability and uptake. For mothers who are already talking with their daughters about HPV vaccine, more could be encouraged to take advantage of this opportunity to promote sexual health.

Health care providers may be able to use HPV vaccination visits to provide information and guidance to parents about discussing sex topics with their children. Research shows that parents want providers to broach sensitive topics like sex,[28, 29] and such an approach is aligned with current guidelines for adolescent preventive services suggesting that providers offer guidance to adolescents and their parents about sexual health.[30] However, provision of such guidance is low.[31–33] Because HPV vaccine protects against an STI, it may provide a natural segue to talking about sex. As it is recommended for all 11–12 year-old girls and administered over 3 visits,[10] it could be a cue for early and frequent communication about sexual health and an opportunity to integrate preventive counseling and guidance into clinical practice. However, providers may be less likely to recommend HPV vaccine when considering it necessary to discuss sexuality beforehand.[34] Research suggests that training and access to materials for parent education may address some of the barriers clinicians have to broaching sensitive topics.[35] Further, while parents are largely supportive of HPV vaccine, they are more supportive when it is framed as preventing cancer, as opposed to an STI or genital warts only.[36] Thus, it is possible that using HPV vaccine to promote sexuality discussions could negatively affect vaccination rates. The effect of including sexual health promotion messages alongside cancer prevention information on HPV vaccine acceptability should be explored further.

Our study's strengths include a large nationally-representative sample and extensive controls for variables associated with parent-child communication about sex. The main limitation is reliance on mothers' reports, which may not fully reflect actual conversations, as parent and adolescent reports of communication about sex can be discrepant.[4] However, data on parent (as opposed to child) perceptions may be more appropriate for the present study, as it can inform interventions targeting parents. Our study used a single, dichotomous measure of mother-daughter communication; future research should assess the content, timing, and frequency of mothers' conversations with their daughters about HPV vaccine and sex. The study's cross-sectional design precludes causal inferences about associations between HPV

vaccine-related variables and parent-child communication about sex topics. The generalizability of study findings to other populations is unknown.

Conclusion

Our findings highlight the potential of HPV vaccine discussions to promote sexual health. Clearly HPV vaccine discussions are not the only opportunity for mothers to talk with their daughters about sex, but they provide an acceptable opportunity at an age when such communication can be most influential. Given the importance of communication about sex that is early and frequent, conversations about HPV vaccine could facilitate mothers' conversations with their preadolescent and young adolescent daughters. Now that HPV vaccine is also recommended for routine administration to adolescent males,[37] research on parents' communication with their sons about the vaccine and sexual health is warranted. Future research should also examine health care provider communication about HPV vaccine and explore ways to use HPV vaccine and other cues to maximize important discussions about sexual health at different stages of an adolescent's development.

Acknowledgments

Funding/Support:

This study was primarily funded by a grant from the Centers for Disease Control and Prevention (CDC, 02577-10) with additional support for project staff from the American Cancer Society (MSRG-06-259-01-CPPB) and the Cancer Control Education Program at Lineberger Comprehensive Cancer Center (R25 CA57726). Dr. McRee's time on the study was further supported by the Jessie Ball duPont Dissertation Completion Fellowship from the Graduate School at UNC-Chapel Hill.

References

1. DiClemente RJ, Wingood GM, Crosby R, et al. Parent-adolescent communication and sexual risk behaviors among African American adolescent females. J Pediatr. 2001; 139(3):407–12. [PubMed: 11562621]
2. Miller KS, Levin ML, Whitaker DJ, et al. Patterns of condom use among adolescents: the impact of mother-adolescent communication. Am J Pub Health. 1998; 88(10):1542. [PubMed: 9772860]
3. Beckett MK, Elliot MN, Martino S, et al. Timing of parent child communication about sexuality relative to children's sexual behaviors. Pediatrics. 2010; 125:34–42. [PubMed: 19969618]
4. Jaccard J, Dittus PJ, Gordon VV. Parent-adolescent congruency in reports of adolescent sexual behavior and in communications about sexual behavior. Child Dev. 1998:247–61. [PubMed: 9499570]
5. Young TL, Zimmerman R. Clueless: parental knowledge of risk behaviors of middle school students. Arch Pediatr Adolesc Med. 1998; 152(11):1137. [PubMed: 9811294]
6. Martino SC, Elliott MN, Corona R, et al. Beyond the "big talk": The roles of breadth and repetition in parent-adolescent aommunication about sexual topics. Pediatrics. 2008; 121(3):e612. [PubMed: 18310180]
7. Rosenthal DA, Feldman SS, Edwards D. Mum's the word: Mothers' perspectives on communication about sexuality with adolescents. J Adolesc. 1998; 21(6):727–43. [PubMed: 9971729]
8. O'Sullivan LF, Meyer-Bahlburg HFL, Watkins BX. Mother-daughter communication about sex among urban African American and Latino families. J Adolesc Res. 2001; 16(3):269.
9. Pluhar EI, DiIorio CK, McCarty F. Correlates of sexuality communication among mothers of 6–12 year old children. Child: Care, Health, and Development. 2008; 34(3):283–90.
10. Markowitz LE, Dunne EF, Saraiya M, et al. Quadrivalent human papillomavirus vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2007; 56:1–24. [PubMed: 17218934]
11. Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: A theory-informed, systematic review. Prev Med. 2007; 45(2–3):107–14. [PubMed: 17628649]

12. Kahn JA, Ding L, Huang B, et al. Mothers intention for their daughters and themselves to receive human papillomavirus vaccine: A national study of nurses. Pediatrics. 2009; 123:1439–45. [PubMed: 19482752]
13. Centers for Disease Control and Prevention (CDC). National, state, and local area vaccination coverage among adolescent 13–17 years--United States, 2009. MMWR Morb Mortal Wkly Rep. 2010; 59(32):1018–23. [PubMed: 20724968]
14. Brabin L, Roberts SA, Stretch R, et al. A survey of adolescent experiences of human papillomavirus vaccination in the Manchester study. Br J Cancer. 2009; 101:1502–4. [PubMed: 19809431]
15. McRee AL, Reiter PL, Gottlieb SL, et al. Mother-daughter communication about HPV vaccine. J Adolesc Health. 2011; 48(3):314–7. [PubMed: 21338906]
16. Dennis, JM. Description of within-panel survey sampling methodology: the Knowledge Networks approach. 2009. [cited 2009 July 7]; Available from: http://knowledgenetwoks.com/ganp/docs/KN%20Within-Panel%20Survey20Sampling%20Methodology.pdf
17. American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 6. AAPOR; 2009. Response Rate 4.
18. Miller KS, Fasula AM, Dittus P, et al. Barriers and facilitators to maternal communication with preadolescents about age-relevant sexual topics. AIDS Behav. 2009; 13(2):365–74. [PubMed: 17985227]
19. Reiter PL, Brewer NT, Gottlieb SL, et al. Parents' health beliefs and HPV vaccination of their adolescent daughters. Soc Sci Med. 2009; 69(3):475–80. [PubMed: 19540642]
20. Miller KS, Whitaker DJ. Predictors of mother-adolescent discussions about condoms: implications for providers who serve youth. Pediatrics. 2001; 108:2.
21. Wilson EK, Dalberth BT, Koo HP, et al. Parents' perspectives on talking with preteenage children about sex. Perspec Sex Repro Health. 2010; 42(1):56–63.
22. McNeely C, Shew ML, Beuhring T, et al. Mothers' influence on the timing of first sex among 14- and 15-year-olds. J Adolesc Health. 2002; 31(3):256–65. [PubMed: 12225738]
23. Hofstetter CR, Hovell M, Myers CA, et al. Patterns of communication about AIDS among Hispanic and Anglo adolescents. Am J Prev Med. 1995; 11:231–7. [PubMed: 7495599]
24. Hutchinson MK. The influence of sexual risk communication between parents and daughters on sexual risk behaviors. Fam Rel. 2002:238–47.
25. Whitaker DJ, Miller KS, May DC, et al. Teenage partners' communication about sexual risk and condom use: The importance of parent-teenager discussions. Fam Plann Perspec. 1999:117–21.
26. Fox GL, Inazu JK. Patterns and outcomes of mother-daughter communication about sexuality. Journal of Social Issues. 1980; 36(1):7–29.
27. Hadley W, Brown LK, Lescano CM, et al. Parent–adolescent sexual communication: Associations of condom use with condom discussions. AIDS Behav. 2009; 13(5):997–1003. [PubMed: 18841462]
28. Dempsey AF, Singer DD, Clark SJ, et al. Adolescent preventive health care: What do parents want? J Pediatr. 2009; 155(5):689–94. [PubMed: 19643441]
29. Ford CA, Davenport AF, Meier A, et al. Parents and health care professionals working together to improve adolescent health: The perspectives of parents. J Adolesc Health. 2009; 44(2):191–4. [PubMed: 19167670]
30. Hagan, J.; Shaw, J.; Duncan, P., editors. Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents. 3. Elk Grove Village, IL: American Academy of Pediatrics; 2008.
31. Irwin CE, Adams SH, Park MJ, et al. Preventive services for adolescents: Few get visits and fewer get services. Pediatrics. 2009; 123:e565–3572. [PubMed: 19336348]
32. Burstein GR, RL, Klein JD, et al. Missed opportunities for sexually transmitted diseases, human immunodeficiency virus, and pregnancy prevention services during adolescent health supervision visits. Pediatrics. 2003; 111:996–1001. [PubMed: 12728079]
33. Rand CM, Auinger P, DKJ, et al. Preventive counseling at adolescent ambulatory visits. J Adolesc Health. 2005; 37(2):87–93. [PubMed: 16026717]

34. Daley MF, Crane LA, Markowitz LE, et al. Human papillomavirus vaccination practices: a survey of US physicians 18 months after licensure. Pediatrics. 2010; 126(3):425–33. [PubMed: 20679306]

35. Miller KS, Wyckoff SC, Lin CY, et al. Pediatricians' role and practices regarding provision of guidance about sexual risk reduction to parents. J Primary Prevent. 2008; 29:279–91.

36. Sperber NR, Brewer NT, Smith JS. Influence of parent characteristics and disease outcome framing on HPV vaccine acceptability among rural, Southern women. Cancer Causes Control. 2008; 19:115–8. [PubMed: 17952620]

37. Roehr B. US committee recommends HPV vaccine for boys. BMJ. 2011:343.

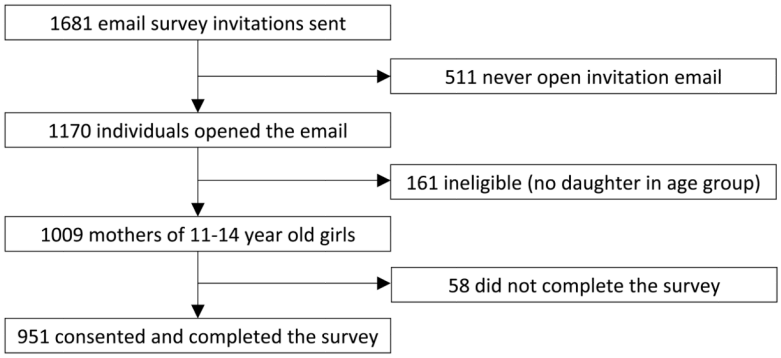

Figure 1.
Study flow diagram

Table 1

Characteristics of the study sample (n=900)[a]

	n (%)
Mother characteristics	
Age	
<40 years	294 (43)
40–49 years	482 (47)
≥50 years	124 (10)
Race/ethnicity	
Non-Hispanic white	686 (64)
Non-Hispanic black	82 (16)
Hispanic	78 (14)
Other race/ethnicity	54 (6)
Education	
High school or less	130 (33)
Some college	334 (37)
College degree or higher	436 (30)
Marital status	
Other	144 (19)
Married/living with a partner	756 (81)
Born-again Christian	
No	556 (60)
Yes	344 (40)
Political leaning	
Conservative	395 (44)
Moderate	327 (42)
Liberal	178 (14)
Mother's beliefs and knowledge	
Satisfied with relationship with daughter	
Not strongly agree	277 (33)
Strongly agree	623 (67)
Perceived communication with daughter	
Poor/fair/good	122 (14)
Very good/excellent	778 (86)
Talked with own mother about sex	
No	653 (72)
Yes	247 (28)
Thought daughter should wait until she's married to have sex	
Not agree[b]	225 (25)
Agree/strongly agree	675 (75)
Thought daughter having sex while she's a teenager could be okay	
Not agree[b]	860 (97)

	***n* (%)**
Agree/strongly agree	40 (3)
Knew that HPV is a STI	
No	203 (29)
Yes	562 (53)
Don't know	135 (18)
HPV vaccine knowledge, mean (SD)[c]	0.44 (0.33)
Daughter characteristics	
Age	
11–12 years	420 (48)
13–14 years	480 (52)
Had an older sister	
No	609 (67)
Yes	291 (33)
Household characteristics	
Annual household income	
<$60,000 (Ref)	325 (48)
≥$60,000	575 (52)
Urbanicity[d]	
Rural	126 (18)
Urban	774 (82)
Region of residence	
Northeast	148 (15)
South	257 (37)
Midwest	277 (25)
West	218 (22)

[a] Table shows raw frequencies and weighted percentages. Percentages may not total 100% due to rounding.

[b] Includes responses of "strongly disagree," "disagree," and "neither agree nor disagree."

[c] Proportion of correct responses on 4 HPV vaccine knowledge items (range: 0–1). Component items included knowledge that HPV vaccine: prevents most genital warts, prevents most cervical cancer, is recommended for 11–12 year old girls, and works best if girls get it before they start having sex. Mothers received these items before they received informative statements about HPV vaccine.

[d] "Urban" defined as living in a metropolitan statistical area (MSA), "rural" as living outside of an MSA.

Table 2

Proportion of mother-daughter communication about sex attributable to potential cues[a]

	Reported the cue		Cue led to conversation about sex topics			
	n	**%**	***n***	**Among mothers reporting cue %**	**Among all mothers %**	***p***
All mothers, *n*=900						
Mother talked with daughter about…						
HPV vaccine	594	65	261	41	27	[ref]
puberty/physical development	886	96	629	70	68	**
alcohol/drugs	887	97	274	30	29	
Daughter has gotten her period	542	61	206	35	21	
Daughter is interested in boys/dating	502	60	306	60	36	*
Daughter's school has sex education class	613	64	461	71	46	**
Daughter has initiated HPV vaccine[b]	271	31	95	35	11	**
Daughter may be sexually active	56	7	46	87	6	**
Mothers who had talked about sex, *n*=792						
Mother talked with daughter about sex because…						
daughter asked about it	565	74	n/a	-	63	**
daughter's friends are having sex/talking about it	308	41	n/a	-	35	*
something in the media	587	70	n/a	-	60	**
something else	321	35	n/a	-	30	**

Abbreviations: HPV= human papillomavirus; n/a= not applicable as asked only of mothers who had discussed sex with their daughters; ref=comparison cue.

[a] Table shows observed frequencies and weighted percentages. Asterisks denote differences between proportion attributable to HPV vaccine discussions and other potential cues based on McNemar's chi-square statistic.

[b] Defined as having received at least 1 shot of HPV vaccine.

* $p<.05$,

** $p<.001$.

Table 3

Correlates of mother-daughter communication about sex topics (n=900)[a]

	Ever talked with daughter about sex topics *n* (%)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Overall	792 (86)	-	-
Potential cues to talking about sex			
Talked with daughter about…			
HPV vaccine			
No	240 (74)	1 [reference]	1 [reference]
Yes	552 (92)	4.10 (2.05–8.23) **	3.25 (1.57–6.68) *
Puberty[b]			
No	6 (31)	1 [reference]	-
Yes	786 (88)	16.14 (2.95–88.39) **	-
Alcohol/drugs[b]			
No	10 (83)	1 [reference]	-
Yes	782 (86)	1.23 (0.24–6.34)	-
Daughter has gotten her period			
No	289 (76)	1 [reference]	1 [reference]
Yes	503 (92)	3.70 (1.83–7.48) **	2.37 (1.08–5.23) *
Daughter is interested in boys			
No	322 (78)	1 [reference]	1 [reference]
Yes	470 (91)	2.86 (1.36–6.01) *	2.51 (1.25–5.02) *
Daughter had sex education in school			
No	197 (77)	1 [reference]	1 [reference]
Yes	569 (92)	3.36 (1.62–6.97) **	2.19 (1.13–4.22) *
Don’t know	26 (61)	0.48 (0.14–1.60)	0.73 (0.20–2.68)
Daughter has initiated HPV vaccine[c]			
No	546 (83)	1 [reference]	1 [reference]
Yes	246 (92)	2.52 (1.33–4.77) *	0.79 (0.33–1.86)
Perception of daughter’s sexual activity			

	Ever talked with daughter about sex topics *n* (%)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Not sexually active	738/844 (85)	1 [reference]	1 [reference]
May be sexually active	54/56 (98)	9.12 (1.71–48.54) *	3.52 (0.60–20.48)
Mother characteristics			
Age			
<40 years	257 (84)	1 [reference]	-
40–49 years	421 (87)	1.29 (0.64–2.62)	-
≥50 years	114 (88)	1.48 (0.44–5.05)	-
Race/ethnicity			
Non-Hispanic white	600 (86)	1 [reference]	-
Non-Hispanic black	73 (86)	1.05 (0.37–2.93)	-
Hispanic	70 (82)	0.76 (0.23–2.50)	-
Other race/ethnicity	49 (93)	2.30 (0.72–7.32)	-
Education			
High school or less	108 (77)	1 [reference]	1 [reference]
Some college	292 (88)	2.14 (1.01–4.51)	1.93 (0.87–4.27)
College degree or higher	392 (92)	3.26 (1.58–6.71) **	2.62 (1.24–5.50) *
Marital status			
Other	133 (91)	1 [reference]	-
Married/living with a partner	659 (84)	0.56 (0.19–1.64)	-
Born-again Christian			
No	482 (84)	1 [reference]	-
Yes	310 (88)	1.31 (0.65–2.65)	-
Political leaning			
Conservative	349 (86)	1 [reference]	-
Moderate	281 (84)	0.88 (0.42–1.87)	-
Liberal	162 (90)	1.43 (0.63–3.22)	-
Mother's beliefs and knowledge			
Satisfied with relationship with daughter			
Not strongly agree	244 (83)	1 [reference]	-
Strongly agree	548 (87)	1.40 (0.68–2.88)	-

	Ever talked with daughter about sex topics *n* (%)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Perceived communication with daughter			
Poor/fair/good	106 (73)	1 [reference]	1 [reference]
Very good/excellent	686 (88)	2.58 (1.06–6.29) *	3.04 (1.28–7.24) *
Talked with own mother about sex			
No	559 (82)	1 [reference]	1 [reference]
Yes	233 (95)	4.62 (2.22–9.64) **	5.75 (2.32–14.21) **
Thought daughter should wait until she's married to have sex			
Not agree[e]	149 (61)	1 [reference]	-
Agree/strongly agree	445 (66)	1.65 (0.80–3.41)	-
Thought daughter having sex while she's a teenager could be okay			
Not agree[e]	569 (65)	1 [reference]	-
Agree/strongly agree	25 (53)	0.73 (0.13–4.12)	-
Knew that HPV is a STI			
No	172 (84)	1 [reference]	-
Yes	509 (89)	1.58 (0.70–3.54)	-
Don't know	111 (77)	0.63 (0.24–1.63)	-
HPV vaccine knowledge, mean (SD)[d]	0.46 (0.33)	2.70 (1.02–7.10) *	0.95 (0.31–2.91)
Daughter characteristics			
Age			
11–12 years	344 (79)	1 [reference]	1 [reference]
13–14 years	448 (92)	3.04 (1.47–6.29) **	1.14 (0.51–2.54)
Has an older sister			
No	531 (86)	1 [reference]	-
Yes	261 (86)	0.99 (0.46–2.12)	-
Household characteristics			
Annual household income			
<$60,000	287 (85)	1 [reference]	-
≥$60,000	505 (86)	1.02 (0.51–2.04)	-
Urbanicity			

	Ever talked with daughter about sex topics	Bivariate	Multivariate
	n **(%)**	**OR (95% CI)**	**OR (95% CI)**
Rural	110 (80)	1 [reference]	-
Urban	682 (87)	1.63 (0.65–4.09)	-
Region of residence			
Northeast	122 (84)	1 [reference]	1 [reference]
South	224 (83)	0.93 (0.42–2.02)	0.97 (0.44–2.16)
Midwest	247 (84)	1.00 (0.42–2.38)	1.43 (0.61–3.30)
West	199 (92)	2.22 (1.07–4.60) *	2.80 (1.11–7.08) *

Abbreviations: HPV=human papillomavirus; CI= confidence interval; OR= odds ratio; SD= standard deviation.

[a] Table shows observed frequencies and weighted estimates. Multivariate model contains all correlates $p<.10$ in bivariate models.

[b] Shown for descriptive purposes; not included in multivariate model due to small expected cell size (<5).

[c] Defined as having received at least 1 shot of HPV vaccine.

[d] Proportion of correct responses on 4 HPV vaccine knowledge items (range: 0–1). Component items included knowledge that HPV vaccine: prevents most genital warts, prevents most cervical cancer, is recommended for 11–12 year old girls, and works best if girls get it before they start having sex. These items were asked prior to mothers receiving informative statements about HPV vaccine.

[e] Includes responses of “strongly disagree,” “disagree,” and “neither agree nor disagree.”

* $p<.05$,

** $p<.001$.